END

FILMED

DTIC

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AUDITING:
PERSPECTIVES FROM MULTIPERSON DECISION THEORY

by

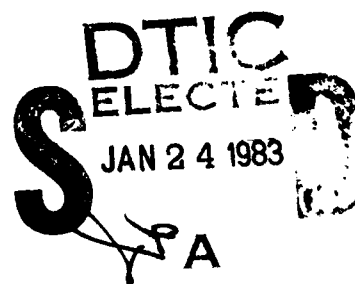ROBERT WILSON

TECHNICAL REPORT NO. 385

October 1982

THE ECONOMICS SERIES

INSTITUTE FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES

FOURTH FLOOR, ENCINA HALL

STANFORD UNIVERSITY

STANFORD, CALIFORNIA

83 01 06 035

AUDITING:

PERSPECTIVES FROM MULTIPERSON DECISION THEORY

by

Robert Wilson

Technical Report No. 385

October, 1982

THE ECONOMICS SERIES

INSTITUTE FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES
Fourth Floor, Encina Hall
Stanford University
Stanford, California
94305

AUDITING:

PERSPECTIVES FROM MULTIPERSON DECISION THEORY*

by

Robert Wilson

1. Introduction

This paper reports a layman's speculations on what appear to be

fruitful directions for research in accounting theory. I am a layman

in accounting since I have no training adequate for research endeavors,

and I am woefully ignorant of the institutional features. On the

other hand, I have been invited to use the perspective from my research

in multiperson decision theory to see whether it throws any light on

the problems you view as important. You will be the judge of whether

I make any headway on "big" problems, but I ask your indulgence when

I make elementary errors on inconsequential points.

First, a word about the perspective. I and others who have focused

their research on the decision processes of economic agents usually rely

on models in which the decision makers are described as perfectly rational

with enormous powers of calculation. At first this may seem utterly

inappropriate for the study of problems in accounting. Nevertheless,

there is another ingredient that opens the possibility of constructive

results. We take account of the fact that economic agents have severely
limited foresight. That is, they have incomplete information. There are
two main ways in which an agent's information may be incomplete. One
is that he (or she) may be ignorant now of some information known to
others; or in reverse, he may be the one with superior information.
The effects of comparative ignorance are most evident when you want
to predict another's behavior: if you don't know his preferences and
opportunities as well as he does then it will be hard to anticipate
what he will choose to do. In the reverse case, of course, you have
an opportunity to exploit others' ignorance. A second limitation is
that even later on an agent may not be able to observe (at least not
cheaply) all that he might want to know in order to achieve the best
outcome. The effects of limited observability are most evident when
designing incentives: if you won't be able to observe how much effort
your attorney puts into your case then you may want to use a contingent
fee scheme to supplement his motivation. A large part of what I will
say stems from studies of the effects of these information limitations.
Within the field of accounting, I understand, considerable progress
has already been made in this direction. Much of the literature on
Principal-Agent relationships is based on this kind of analysis.

Next, I want to share with you my considerations in selecting a
topic. You are surely aware that accounting theory overlaps the economic
theory of information; after all, information is a large part of
what accountants produce. Also, you are probably receptive to the idea
that game theory might be a useful tool; after all, accountants and

their clients are not always members of a cooperating team -at least
not "independent" accountants- and often accountants are third-parties
to bilateral relationships between firms and investors. So, telling
you that I find economics and game theory to be useful tools is likely
to add nothing. Further, I have the impression that the applications
of the theory of incentives to accounting is already far along, especially
that part that uses the paradigm of Principal-Agent relationships. On
the other hand, I am poorly equipped to attempt an analysis of any
deep problem in accounting theory: I lack the institutional knowledge
that is needed to formulate good models and to guide the analysis along
useful paths.

With all this in mind, I've chosen to say what I can about auditing,
and particularly about the role of public accounting firms. I have
selected this topic because it appears to me that the market for auditing
services might be a fairly interesting instance of a market affected
in important ways by strategic considerations engendered by differences
in information among the principle actors.

I have not attempted any real research on this topic. I intend
only to point at some issues that, to my naive eye, seem to be interesting
and to be amenable to analysis using the tools I know. If these issues
have already been thoroughly resolved then you may find it useful to
compare my perspective with the line the research has actually followed;
otherwise, perhaps I can motivate a few of you to give my suggestions
a try.

I have selected three issues on which to comment. The first,
addressed in Section 2, is the role of reputations. You can think of a

public accounting firm's reputation as embodied in the market value of
its good will. It reflects the economic rent or profit it can earn
from allowing its name to be used in the familiar statements certifying
the accuracy and fairness of a client's financial report -its brand,
if you like. A reputation must, of course, be established and maintained,
and a public accounting firm may work actively to enhance its reputation.
And the rate of return it earns on its reputation is affected by market
forces and the strategies of its competitors, as well as chance events
such as the fortunes or misfortunes of its clients (or inventory or
receivables that manage to disappear). I will mention how some of the
recent work on reputations appears to apply to the special context
of auditing.

The second issue concerns the strategic factors that influence
the choices of what kinds and how much information is revealed in
financial statements. That is, information can be thought of as being
fine or coarse, depending on the degree of detail it provides. Since
auditors wind up verifying this information, I thought you might be
curious about what some theory might say about the considerations that
are likely to influence the choice of fineness. I am vaguely aware that
there are generally accepted standards about this matter, such as the
principle of materiality, and there are requirements imposed by regulatory
agencies, but still I will look at it de novo.

The third issue, examined briefly in Section 4, is the role of
accounting conventions and generally accepted principles in establishing
a language or code that enables users to interpret financial statements.
From the economist's viewpoint, there is a sizable economy of scale

inherent in the establishment of a language. Just as the usefulness of your telephone depends on how many others have one, the usefulness of an accounting convention depends on how many users of financial reports know what it means. This is called a network externality. Further, I surmise that part of your income and your status as a professional stem from your mastery of this language: you can write in it as well as read it; indeed, I suppose that some of you can compose poetry in it. And you have a vested interest in cooperative efforts (e.g. by the FASB and the AICPA) to define and enrich this language, to adapt it to the tasks you encounter in your work. My main point is that the difficulty of achieving a critical mass of professionals adopting a convention is eased by organizations such as the FASB that provide coordinating mechanisms.

I selected these three topics from a preliminary menu. I am sure that you can suggest others that are worth exploring, and I urge you to do it. My message is that these kinds of topics are amenable to scrutiny using the methods of multiperson decision theory derived from game theory and economics that bring out the role of strategic behavior.

2. Reputations

The phenomenon of reputations can be studied with various formulations that focus on different aspects. And the context can vary appreciably. For example, there seems to be a significant difference between the situation in which owners want to monitor managers, and the one in which potential investors want to monitor the present owner-manager. Having to choose, and recognizing that the Principal-Agent literature

already addresses the first situation, I will concentrate on the second and draw upon formulations that are better adapted to it.

Understanding the auditor's role depends upon an analysis of the problem confronting the owner-manager and the potential investor. I interpret their difficulties as originating in the afflictions known as adverse selection and moral hazard. In the case of adverse selection the firm's assets (and liabilities) are fixed but the manager has superior information about their value. There is adverse selection in the sense that at any price the investor offers he will tend to get acceptance only from an owner with assets having a lesser value. Similarly, if the owner offers shares, the higher the value the fewer shares he is inclined to offer. In the latter case, the fraction of shares he offers signals the value, but (as is well known from the many studies of this problem) there tends to be an overinvestment in the signal: in this case the owner finds himself forced to offer fewer shares than he wants in order that his assets not be undervalued by investors. Either way, we see that the owner and investor suffer losses due to the difference in their information. These losses can presumably be lessened if they can obtain reliable verification of the assets' value. Moral hazard differs in that the assets are affected by the owner's actions, and these actions are not directly observable by the investor. For example, he may or may not have maintained them in good condition, or he may have appropriated some. In this situation it is obvious that the transaction depends upon the owner's incentives to conserve the assets, and the design of an effective incentive requires

that the owner's remuneration be contingent upon some observation of
the assets. Here again a resolution of the difficulty lies in improving
the investors' observability of the assets. I think accounting theory
has already studied thoroughly, with one exception, the implications of
this scenario: the value of improved observation creates an opportunity
for the auditor, who can collect a fee for providing reliable verification
of the assets' value.[1]/

The central feature, therefore, is that the auditor's client
(let's say that it is the owner) buys into the auditor's reputation
for accuracy and reliability. By reputation we mean here simply the
investor's probability assessment of the assets' true value conditional
on the auditor's report of the value. Roughly speaking, a high reputation
corresponds to a small variance of this distribution (the owner could
adjust for a known bias, whereas an unknown bias would add to the
variance). Presumably the auditor's reputation is acquired through
experience. Simplifying matters, one can imagine the investor using
Bayes' rule to update the auditor's reputation as the evidence accumulates
over time about the differences between the auditor's reports and the
subsequently revealed values of its clients' assets. (To make this
meaningful, or course, one needs a well-specified model of the probability
structure used by investors, but for now I take it that the idea is
familiar.) Different investors may assess reputations differently, of
course, depending on their preferences, information, and uses for
financial accounting reports. The auditor's incentive to sustain and
enhance its reputation among investors is clear: its reputation is bound

to affect the number and size of its fees from clients. All of this is straightforward.

The interesting research problems focus on the market structure for auditing services. The first task is to identify the determinants of demand and supply. On the demand side there is the evident feature that the demand depends upon the auditor being relatively immune to adverse selection and moral hazard: this uninvolvement of the third-party auditor is not simply captured in the notion of independence revered by the profession. I am thinking of the evident incentives for the auditor to become involved, and how the auditor trades off gains in its reputation with other opportunities. Granted that direct financial interests in the client are excluded, there remains the intriguing prospect that the auditor can exploit economies of scope in its operations. Learning lots of private details about clients and their industries offers opportunities to engage in, say, investment advice or consulting. Theoretical studies may shed some light on this matter, but more likely it is best examined empirically. The prediliction of public accounting firms to develop consulting activities seems particularly worth study. Balanced against the economies of scope, however, are the advantages of specialization that will be discussed later.

One determinant of demand we have already mentioned above: this is the prospect that the owner and investor forego an audit.[2/] If they go this route then the transaction will reflect the "rational expectations" that accompany a signalling equilibrium. The magnitude of the losses sustained this way puts an upper bound on the fee that

an auditor can exact. For a new firm making its first excursion into
the capital markets this may be the main determinant of demand -the owner
has no other option than to rent the auditor's reputation. In the longer
run, however, there are other options. The one deserving close scrutiny,
in my opinion, is the possibility that the client firm builds its own
reputation. Indeed, many large established firms today could probab.
sell their financial instruments without the benefit of an external
auditor's certification (e.g. "shelf" registrations with the SEC see
to reflect this possibility). The game-theoretic analysis of reputation-
building is in its infancy and so far has been adapted solely to the
economic theory of industrial oligopoly, but I think there is potential
to construct such a theory in the context of financial markets.[3/]
Admittedly it is problematic whether the existing formulations are
pertinent to auditing. Usually one assumes that the investor assigns
some small positive probability to the chance that the owner will surely
be honest in reporting the results of an internal audit (for reasons
that are not explained by the theory, but might include anything from
behavioral quirks or moral qualms to countervailing incentives or a
recalcitrant internal auditor); one then shows that if the situation recurs
many times (i.e., the owner will be issuing financial instruments many
times) then in a perfect Nash equilibrium the owner's optimal strategy
is to be honest every time except the last few whether or not he is
truly an honest type. That is, even a dishonest owner finds it best
to imitate honest reporting so as to gain the advantages in subsequent
issues of investor confidence: the short-term gain today from overstating

the assets' value (or better, the prospects for dividends, which will be directly observed by investors) is small compared to the losses attributable to lower share prices in the future when he is found out. This sort of scenario involving an owner and an equity investor can perhaps also be adapted to the traditional conflict between lenders and shareholders that often motivates audits, but of course there is the important feature in this case that a bondholder may observe little evidence of inadequate assets until a calamitous default occurs.

Establishing its own reputation is not, however, a sure-fire alternative for the owner. The specialized auditor with many clients can earn returns on its reputation continually. In contrast, the owner's opportunities are confined to the (usually infrequent) occassions when it seeks new capital. Its reputation is a goodwill asset that is underutilized. Moreover, it seems doubtful that the returns realized are fully valued in the market price of shares, since the reputational goodwill is commingled with other assets whose returns are risky, and being specific to the firm it is not easy salable or transferable. I would like to see an application of the capital asset pricing model that explores this issue. If reputation were an ordinary asset than a naive application indicates that it is fully valued in the market, but in fact reputation is different (e.g. it depends on discretionary choices) and an appropriate formulation should capture this aspect.

Lastly, of course, a demand-side study should estimate the induced demand due to regulatory requirements, but I presume that this obvious topic has already been thoroughly explored -every accountant is surely

curious about how much the price of accounting services has been increased by this addition of a lower bound on the demanded quantity of audits. There is, however, a further aspect that might be explored. Regulatory requirements are public goods for accountants, but so too are the various accounting conventions, principles, and standards developed internally by the profession. Some effort to distinguish between these two sources might be worthwhile. The gist seems to be to distinguish between the network externality discussed in Section 4, with its accompanying returns to the skill level of the practicing auditor that depend on how widespread an adoption is, and the inelasticity of demand induced by regulatory requirements.

On the supply side there is a host of problems deserving study. The priority item, to my unpracticed eye, is a thorough examination of the role of the economies of specialization (and scope) realized by auditors. I find it implausible that there are substantial economies of scale in auditing, or that the major public accounting firms enjoy overwhelming monopoly power. (Indeed, the physical and human capital required for entry into the industry appears to be no great barrier. Although presumably it takes substantial resources to audit a large firm this does not in itself imply economies of scale.) Rather, I surmise that the greatest advantage stems from economies of specialization in building a reputation. As I mentioned above, numerous clients enables an established firm to reinforce its reputation frequently. A higher frequency of audits enables a firm to realize higher returns on its reputation per unit of time, and it provides greater opportunities to

enhance its reputation. It is this feature, perhaps, that accounts for the predominance of a few large premium public accounting firms. The public accounting firm must, of course, use discretion lest its reputation is endangered by carelessness in auditing or by dipping too low into the barrel of potential clients (I suppose that clients have quality ratings too) and of course there is always the chance of an unfortunate lawsuit.
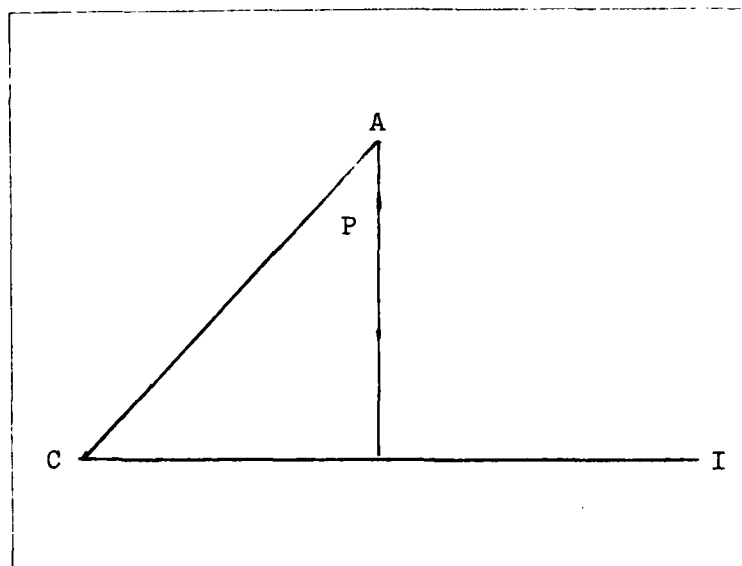
Research here could be either empirical, or theoretical with a focus on modeling reputation formation among investors and boards of directors and analyzing the decision process of the public accounting firm in developing its clientele. Recent research on reputation formation in product markets seems to me to be adaptable to this context.[4/] There does, however, seem to be a distinct difference between the industrial firm and the public accounting firm in that the former produces quality whereas in part the latter verifies quality. Also, unlike quality verifiers in product markets (e.g. Consumers' Union) whose clients are consumers, public accounting firms ordinarily are paid by the firms they audit. Moreover, auditing is intrinsically an intrusive activity requiring the approval and cooperation of the client and some expenditure of resources on complementary internal auditing; in this sense the auditor's relationship with a client is like the doctor-patient relationship.

The strategic behavior of an auditor is, I think, well worth scrutiny. In spite of regulatory requirements I still suppose that the quality of an audit is a matter of choice (for the client as well,

but here I focus on the auditor). An accurate audit is expensive but
it contributes to the public accounting firm's reputation. How hard
should an auditor press a client? (In Section 3 I will elaborate on my
view that clients have an incentive to discourage the revelation of some
kinds of information.) The public accounting firm that merely verifies
the financial reports prepared by the client is more likely to acquire
clients in the short term but is more likely to endanger its reputation
with investors and lose clients in the future. The optimal strategy
is presumably in the middle ground, and an analysis of this decision
problem deserves study.[5] The key feature is that the reputation resides
among investors whereas it is with the client that the auditor negotiates.
The problem is complicated, moreover, by the fact that the auditor is
a self-interested actor in sustaining the general reputation of the
auditing industry, which is a public good among other auditors (though
possible regulatory requirements and professional standards ameliorate
this effect). One expects the auditor to balance off the gains from
cordial relationships among clients and the risk of scorn among investors.
Considering the diversity of "aggressiveness" among public accounting
firms in seeking new business, it would be interesting to study whether
these strategies are transitory adjustments towards a common equilibrium
strategy, or whether equilibrium allows a diversity of strategies -each
adapted to a clientele representing a different market segment. As
researchers in marketing have long emphasized, the structural features of
different market segments may be conducive to "penetration" or "skimming"
strategies, or even to a sequential strategy of penetration followed by
skimming.

Figure 1

'A Schematic Diagram: The AICP Relationship

In Figure 1 I represent the participants' relationships schematically:
the intention is to emphasize the auditor's angle of perspective, denoted
by P, which can be more or less depending on the auditor's pursuit of
the interests of the investor or the client.   The former tends to enhance
the auditor's reputation and the latter tends to attract clients in
the short term.[6/]

Lastly, all of this must be analyzed in the context of a market
equilibrium between demand and supply among all firms and auditors, in
which the equilibrating price is the rate of return earned by auditors
on their invested capital.[7/] Besides the physical and human capital,
of course, is the capital invested in reputation building. That is, to
build a reputation a public accounting firm must absorb the cost of
high quality audits before its reputation is high enough to command a
fee sufficient to cover its expenses.[8/]

It is well to conclude this section by emphasizing a caution suggested by a discussant.[9/] The reputation of a public accounting firm is not directly observable, and if it were it could not be measured easily. Moreover, it would be vacuous, if not fallacious, to suppose that any convenient state variable would be a suitable surrogate for a firm's reputation. If the notion of the reputation of a public accounting firm is to be more than an empty tautology, preferably a useful one of the genre endorsed by Michael Jensen, it must be specified so that theoretical predictions imply genuine restrictions on the data. The caution, therefore, is that any constructive empirical study of reputations must be supplemented by the development of appropriate measures that can be closely tied on a priori grounds to reputational effects (assuming accountants can reasonably agree on what these are intended to be). Ideally, perhaps, one would like to draw on case studies of the sort quoting a managing partner to the effect, "cost be damned, we've got to follow through on this one thoroughly or we'll jeopardize... ." Another approach that comes to mind is to rely on publicly observed incidents: lawsuits, SEC strictures, disclaimers, et cetera. I'm also curious about a questionaire approach: does any managing partner perceive his firm's reputation as an important consideration?

3. Fineness of Information

The choice of how fine is the information in a financial statement is affected by several factors that I suppose have been well studied and surely are well understood by clients and auditors. SEC regulations

establish mandatory standards in some cases, and professional standards of practice affect many categories; also, I understand that the principle of materiality has an important influence. Further, fine detail is expensive and no doubt both the client and the auditor are sensitive to cost considerations. The preparation of a financial statement is, however, more a matter of selecting and aggregating data than is it one of search and discovery.[10/] I think it is worthwhile, therefore, to explore the strategic considerations that might influence disclosure.

It is worthwhile to recall first the ramifications of the discussion in Section 2. From the auditor's viewpoint an important consideration is the balancing act between the client and the investor: the auditor's motive, I've argued, is in part to gain clients without jeopardizing its reputation with investors. Although I find it difficult to posit a good formulation of how this feature affects the choice of fineness by the auditor I anticipate that it must have the feature that there is some advantage to confining itself to the narrow task of verification of the financial reports prepared by the client (or issuing a disclaimer if necessary). Undertaking evidentiary activities of a more exploratory kind in the interests of the investing public (ranging from simple snooping around to genuinely investigative research) would seem to affect client relationships adversely (unless expressly requested by a curious board of directors) with only marginal impact on the reputation with investors in the great majority of instances (assuming the public accounting firm has the advantage of quality clients); that is, unless there is a prior assessment among investors that deception is likely it seems that the

auditor wants only to do what it was paid for. Secondly, evaluative activities, such as rating the merits of buying the client's shares or bonds, would involve the auditor in speculative attempts to predict the future. It seems evident to me that this could only jeopardize the auditor's reputation: building a reputation as a financial analyst is a much more risky undertaking than building a reputation as an auditor, and attempting and failing at the first could destroy all that was invested in building the latter. I grant that auditors make some feints at prediction (depreciation, inventories, receivables, exchange rates, accruals in general), but there is an order of magnitude difference between the probabilities of misjudging these and of misjudging the client's prospects in the product markets -even if the two are correlated the variances of estimation are quite different.

Second, I am aware that in the Principal-Agent literature there has already been considerable research done on the optimal amount of monitoring as part of the design of incentive schemes -so I will forego any suggestions in that direction.

My main interests are rather in the client-investor relationship and in the impact of the client's competitive position. The first of these takes the form here that the client wants to purchase, from the auditor, credibility with the investor so as to induce demand for the client's financial instruments. That is, there is the familiar partial conflict of interest between current equity holders and prospective equity (or debt) purchasers. Further, as a technical matter it is important to realize that this situation can not be modeled accurately by the

Principal-Agent paradigm that supposes that the Principal has an early

opportunity to create an incentive system to which the Agent responds,

and that employs a Stackelberg equilibrium. In the capital markets the

actors on the two sides of a transaction ordinarily act without prior

arrangements about incentives, and with simple expectations about the

significance of bids and offers or the meaning of financial reports.

In this situation the appropriate solution concept is a Nash equilibrium.

Recent research using this approach can, I think, be usefully applied

to the client's decision problem about how fine should be the information

in a financial report.$\underline{11/}$ The models studied so far are essentially

static but of course dynamic models would better capture anticipations

of subsequent strategies.

I will briefly describe the sort of model that is used and the

main result. The setting is a game with two players called the Sender

(the owner) and the Receiver (the investor). The Sender first receives

some information (the assets' value) and then sends a report (the

financial statement) to the Receiver, after which the Receiver takes

an action (whether or not to buy shares or bonds) that affects the

payoffs of both players. If suitable regularity assumptions are satisfied

then the main result is that in every Nash equilibrium the Sender transmits

less than perfect information. The rationale behind this result is quite

transparent: if the report enabled the Receiver to figure out the Sender's

private information and take his optimal action, then (given that their

preferred actions differ) the Sender would prefer to send a misleading

report that induces the Receiver (presumably still acting under the

naive supposition that the report is to be taken at face value) to take another action that is better for the Sender. Moreover, there is actually an optimal degree of imperfection to the information transmitted: the Nash equilibria are ordered by the Pareto criterion and the best of these equilibria (best for both parties) has the optimal amount of coarseness among all equilibria.

I interpret this result as indicating that the conflict of interest between the owner and the investor leads to a well-defined level of detail in the financial report offered by the owner, and that this detail necessarily involves some degree of departure from perfect information. It is striking that the result depends only on the structural features of the situation, and the participants' partial conflict of interest, and does not invoke any appeal to the cost of acquiring, verifying, or transmitting information. (It does depend on the presumption that the investor has a nearly insatiable demand for information, or at least prefers more than the owner chooses to release, but I doubt this is far wrong.) I am admittedly quite naive about the preparation of financial reports, but for me this analysis is a step forward in my attempts to understand financial reporting. I have been perplexed by the seemingly arbitrary choice of categories and the degree of aggregation in financial reports since my one and only accounting course.[12]

An intriguing possibility in this connection is that accounting might be susceptible to experimental studies. Would subjects in the positions of Sender and Receiver behave according to the above predictions?

The above scenario is overly simplified, of course, and as in
seemingly all game-theoretic analyses it is likely that the conclusions
would be altered substantially in a dynamic version of the model.[13/] In
particular, it is possible that in the context of repeated plays of the
game the Sender might provide more accurate information with the under-
standing that the Receiver would not use it solely to his own advantage
-an arrangement presumably policed by the anticipation that selfish
behavior would be reciprocated.

I have always thought that investors would be even more interested
in reports that included (besides snapshots of the firm's assets and
liabilities and revenue, cost, and earnings flows) genuine sensitivity
analyses that would indicate how the firm would fare with changing
conditions in its factor and product markets. A crucial item that
most investors might want to know is the firm's marginal cost; yet
financial reports seem purposely designed to hide this information.
Accountants both internal and external undertake great labors to allocate
costs and arrive at an average cost figure that is hardly useful to
anyone (at least not to any economist).[14/] Is there an explanation?
Here you will no doubt perceive me to be far out on a limb with no
retreat, but here goes. Even granting that average costs are relevant
to the long run profitability and survival of the firm, I guess that
almost every firm guards well its marginal cost because it plays such
a crucial role in the competitive process in the product market. The
game-theoretic studies of monopolistic and oligopolistic competition
that now abound are unanimous in emphasizing that the firm's proprietary

information about its marginal cost is a key factor affecting entry
into the industry, capacity expansion, product differentiation, and direct
price competition.[15/] Indeed, one can verify the sizable effects of
privately known cost information in even the simplest Cournot duopoly
model where each firm is uncertain about the marginal cost of the other.
Given the intrusive nature of the auditing process, the client hires the
auditor and controls access; nevertheless, it is hard to imagine that
auditors do not gain considerable proprietary information about a client's
cost structure. I conclude, therefore, that to a degree the auditor
is necessarily in collusion with the client (and the potential investor)
to maintain the privacy of this critically important information. I
wonder how many accounting practices dealing with cost allocation are
indirectly influenced by this overriding clause in the implicit contract
between the auditor and the client.[16/] Am I correct in supposing that the
auditor that insisted on revealing a client's marginal cost would soon
have few clients? If so then I think that a program of research using
models of competition in the product market to predict what kinds of
information will be omitted from public financial reports could be a
useful endeavor.[17/] There is perhaps also the possibility of an empirical
study correlating the intensity of competition in the product market
with the omission of variable cost information in the financial statements.

The foregoing may seem to be in conflict with the evident advantages
of full information sharing among the members of a team, in this case
the present and prospective owners/investors. It is not, however, since
we are considering the matter prior to the investor's choice of whether

or not to buy shares and how many and at what price, and it is this
choice about which the owner's and the investor's preferences diverge.
Consider therefore the situation that arises subsequent to the share
purchase, when the investor is already "on board". More generally, there
are several individuals, each possibly having some private information
relevant to a decision that they will take together and then split the
resulting returns according to a sharing rule. They stand to gain
collectively if they base their decision on their pooled information
but it may be that no individual has an incentive to report correctly
what he knows. It would be valuable to establish sufficient conditions
for there to exist a Nash equilibrium in which each individual is truthful;
that is, each prefers to be truthful if he expects all others to be
truthful. One sufficient condition is the following: the sharing
rule is an efficient one for sharing risk, and it is linear.[18/] This
formulation is obviously applicable more to internal auditing but it
may have some implications for financial reporting.

4.   Network Externalities and Public Goods

In some ways it is remarkable that financial reporting and auditing
are successfully organized in the private sector with only mild regulatory
controls and considerable discretion left to professional bodies. After
all, an auditor's verification of a financial statement is a public good
for investors, and each investor enjoys economies of scale in the use
of this information.[19/] Moreover, since each auditor has some opportunity
to milk the collective reputation of the auditing industry (presuming

that some investors do not fully distinguish among auditors), it is rather
remarkable that the professional codes of behavior promulgated by such
bodies as the AICPA are so lightly applied. Ruminating on the origins
of this success I am inclined to speculate that it stems from a substantial
individual as well as collective interest in a public good shared in
common among auditors, and accountants generally for that matter.

As I mentioned earlier, I interpret the collection of accounting
conventions, practices, standards, principles, et cetera as a code or
language, and to some degree the professional auditor is an adept master
of this language. Among auditors, therefore, a financial accounting
practice produces a network externality: its value as a contribution
to the language depends in part on the proportion of the professionals
who adopt it. More than a natural language this is one that is amenable
to design and reasoned consideration of the merits of each proposed
innovation. There is, nevertheless, a fundamental difficulty. The
adoption of each innovation is costly in various ways to each professional,
so no single auditor wants to invest in the task of mastering and imple-
menting a proposed change unless there is a substantial chance that it
will be widely adopted.[20] Thus, the difficulty is how to coordinate
the decisions of the many individuals (and public accounting firms)
who are affected. My supposition is that bodies such as the FASB serve
a dual purpose: besides analyzing proposals and recommending adoptions,
there is the further aspect that they provide the highly visible coordinating
mechanism that is required. That is, they generate "rational expectations".

I recall from a conversation a few years ago that the mode has been to analyze the role of these bodies in terms of the private interests their recommendations help or hinder. Even so, I think it might be worthwhile to consider also the possibility that these bodies serve the collective interest of the profession in designing and coordinating innovations in the language of financial reporting. A research program would need to separate the private and public goods produced, but I am at a loss to suggest the best methodology.[21/]

5. Empirical Methodology

In this section I respond briefly to the comments of the discussants regarding the role of empirical studies in accounting theory. I acknowledge forthwith that surely in accounting, as in any practical science, a theory must be judged in terms of its usefulness. A theory can be useful for prediction, it can capture the structural features of cause and effect, and in a managerial science it can improve decisions. Not being an accountant, I'm quite willing to urge accountants to mine the data, to observe and test, to address real issues verified by practically relevant concerns, to rely only on empirically validated relationships and numerical magnitudes. And surely the best career advice for a doctoral student is to learn and exploit the institutional structure and quantitative features of accountancy. Substantial contributions to accounting theory and practice must address the important problems and be true to the facts.

The fact remains, nevertheless, that all of the speculations elaborated above are devoid of any substantial empirical justification. So I urge anyone who pursues any of the suggestions I've made to check first that the facts warrant the effort. I am not in a good position to judge, since this is my only foray into accounting, but I am confident that you are well-prepared to discard the chaff.

6. Conclusion

It is evident that I do not know much about accounting, nor about auditing in particular. I hope, though, that I have conveyed my impression that what I see there indicates an ample supply of challenging topics for research. Acknowledging the prejudice of my current interest in multiperson decision theory, and my favoritism in my own research towards the methodologies of economics and game theory, still I perceive that several topics might be addressed with these tools of modeling, analysis, and empirical testing. I chose auditing as a topic rather haphazardly but still found enough to fill an hour-long talk. My guess is that nearly any sizable topic would be equally rich in material. The plain fact is that practitioners are always far along in understanding and exploiting the structural features of the problems they encounter. Researchers come around later trying to arrange things into "theories" but always the challenge exceeds their competence -if only because they are not fully embroiled in the rich detail that the practitioners cope with and understand. So, the aspiration level in research can be at most to outline a few main features, hoping with equally few broad strokes

to capture the profile. The one stroke I propose here is that auditing
might be viewed as imbedded in a multiperson decision problem in which
differences in information are important aspects.

Footnotes

1/ The exception is that the Principal-Agent literature has relied on a formulation in which the Principal (here, the investor) moves first to design an incentive and monitoring scheme to which the Agent (here, the owner or manager) then responds. This is essentially a Stackelberg equilibrium. (So as not to perpetuate an unfortunate confusion between choices of models and choices of equilibrium concepts, I mention that a Stackelberg equilibrium in which one player anticipates the reaction of another is simply a Nash equilibrium of the game in which the players move in sequence and the second observes the move of the first.) The auditing context should, I think, be studied also as a Nash equilibrium of a simultaneous-move game in which the investor does not have a first opportunity to put an incentive scheme into operation; rather, the investor and the owner each respond individually to their strategic opportunities without foreknowledge of the others reaction. Presumably each actor has the option of invoking an audit, except that the owner has the option of blocking an audit initiated by the investor. In this formulation the contingent payoffs of the owner or manager are not designed by the investor, rather payoffs are jointly determined by the interaction of their two strategies.

2/ There are of course regulatory requirements for an audit but relying on this imposed demand begs the question of why audits are treated as public goods and it does not address the case of municipalities that rely on internal auditors. In any case there is a considerable range of choice about the quality of an audit: one needs to explain why audits are not perfunctory, or performed by fly-by-night operators. I will take it for granted that among profit-making enterprises internal audits do not sufficiently escape the afflictions of adverse selection and moral hazard.

3/ Three of the relevant papers appear in an issue of the Journal of Economic Theory: see references to Kreps, Milgrom, Roberts and Wilson [1982], Kreps and Wilson [1982], and Milgrom and Roberts [1982].

4/ The pertinent reference is a recent working paper by Carl Shapiro [1982].

5/ Postscript: I have belatedly read the paper by Linda E. DeAngelo, "Auditor Size and Audit Quality," Journal of Accounting and Economics, 3 [1981], pp. 183-199. She developes an argument that an auditor with numerous clients may have less incentive to acceed to a client's preference.

6/ In my oral presentation I used the unfortunate terminology (which I subsequently emphasized was not intended to be pejorative) that the auditor chooses whether to build or milk its reputation. Sorry about the connotations.

7/ An alternative to the study of a market equilibrium is a game-theoretic analysis (in which a Nash equilibrium is the relevant solution concept) of the repeated game among an owner, an investor, and an auditor. Eventually one must hope to combine the two approaches.

8/ This is to be distinguished from a lower fee for an initial engagement with a new client that reflects the transaction costs involved in changing auditors.

9/ I am grateful to Robert Kaplan for this observation.

10/ I am grateful to Robert Kaplan for this observation.

11/ The main references are Crawford and Sobel [1981] and Green and Stokey [1981].

12/ Called "Control" at the Harvard Business School in 1959, and taught by Richard Vancil and Charles Christenson. I was happy to find Chuck in the audience.

13/ I am indebted to Joel Demski for this important point. A recent paper on this subject is by Joel Sobel [1982].

14/ Like other laymen susceptible to fits of paranoia, in times of frustration I take the conspiracy view of accounting practices.

15/ An excellent reference is Milgrom and Roberts "Limit Pricing and Entry Under Incomplete Information: An Equilibrium Analysis," [1982].

16/ I have wondered if the protection of proprietary information is part of what is meant by the standard of fairness in auditing.

17/ In Clarke [1982], using results from Cournot models, it is argued that competitive firms have an incentive to withhold their private information from industry trade associations. Gal-Or [1982] relaxes Clarke's independence assumptions about statistical information and shows that with correlated signals about demand some information sharing may be consistent with a Nash equilibrium but complete sharing is consistent only if the signals are relatively precise.

18/ This elementary result is in "Incentive Compatible Risk Sharing," [1979].

19/ I have studied informational economies of scale in a paper by the same name in The Bell Journal of Economics, [1982] Spring.

20/ A valuable analysis of network externalities and the role of a critical mass of adoptions is provided in Oren and Smith [1981].

21/ I was intrigued some years ago to learn that the Norwegian language has been redesigned several times. I wonder if some linguist did a benefit/cost calculation.

References

Clarke, R.N. [1982], "Collusion and the Incentives for Information Sharing," Technical Report 8203, Social Systems Research Institute, University of Wisconsin, January.

Crawford, V.P. and J. Sobel [1981], "Strategic Information Transmission," Technical Report, Department of Economics, University of California at San Diego, November (revised edition).

Gal-Or, E. [1982], "Information Sharing in Oligopoly," Technical Report, Graduate School of Business, University of Pittsburgh, June.

Green, J.R. and N.L. Stokey [1981], "A Two Person Game of Information Transmission," Technical Report 751, Harvard Institute for Economic Research, Harvard University, March (revised December).

Kreps, D.M., P. Milgrom, J. Roberts, and R. Wilson [1982], "Rational Cooperation in the Finitely-Repeated Prisoners' Dilemma," Journal of Economic Theory, Vol. 27; pp. 245- 252, August.

Kreps, D.M. and R. Wilson [1982], "Reputation and Imperfect Information," Journal of Economic Theory, Vol. 27; pp. 253-279, August.

Milgrom, P. and J. Roberts [1982], "Predation, Reputation, and Entry Deterrence," Journal of Economic Theory, Vol. 27; pp. 280-312, August.

Milgrom, P. and J. Roberts [1982], "Limit Pricing and Entry Under Incomplete Information: An Equilibrium Analysis," Econometrica Vol. 50; pp. 443-459.

Oren, S.S. and S.A. Smith [1981], "Critical Mass and Tariff Structure in Electronic Communications Markets," The Bell Journal of Economics, Vol. 12, pp. 467-487; Autumn.

Shapiro, C. [1981], "Premiums for High Quality Products as Rents to Reputation," Technical Report 6, Woodrow Wilson School, Princeton University, April.

Shapiro, C. [1982], "Consumer Information, Product Quality, and Seller Reputation," Bell Journal of Economics, Vol. 13, pp. 20-35; Spring.

Sobel, J. [1982], "A Theory of Credibility," Technical Report 82-33, University of California at San Diego, September.

Wilson, R. [1975], "Informational Economies of Scale," The Bell Journal of Economics, Vol. 6, pp. 184-195, Spring.

Wilson, R. [1979], "Incentive Compatible Risk Sharing," Technical Report, Stanford University, March.

REPORTS IN THIS SERIES

Reports in this Series

END

FILMED

2-83

DTIC